Bioenergy UPDATE

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Braymo Corporation—A Leading Supplier of Bioenergy Systems

Also in this Issue:

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INSIDE THIS ISSUE

On the cover: A picture of a 3 million Btu wood-fired Braymo boiler facility

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Braymo Corporation—A Leading Supplier of Bioenergy Systems

Braymo Corporation, located in Steinbach, Manitoba, is one of the leading biomass energy systems suppliers in North America. Depending on the model (which depends on the fuel), biomass-fueled boilers and furnaces can range in size from 1 to 45 million Btu/hr.

The company will design complete heating systems for its customers and then supply the complete system to them. Company engineers select what is best suited for their clients' needs instead of pushing particular products. Systems can be designed and built for heating one building, heating multiple buildings, adding to an existing system, process heating or looking for a totally unique, one-of-a-kind application.

To simplify installation and reduce installation costs, each system is assembled as far as practical before shipping. The company also provides installation drawings and toll free phone support.

Braymo manufactures their product line which includes radiator fan units, air make-up units, boilers, furnaces, mixing stations, electronic controls, electrical control panels, electronic safety controls, and a variety of related products. The company also designs burners for other companies and buys, refurbishes, and resells used boilers.

Braymo has sold their equipment all over North America and has a generous lease-to-own program. With credit approval (which the company says usually takes just a few hours), a customer can receive a heating system with no money down.

The equipment lease program provides a tax advantage that helps the cash flow for the customer. In most cases, the write-offs can be accelerated because the lease payments are 100% tax deductible. Leasing equipment also preserves bank credit lines for other working capital needs such as day-to-day expenses and miscellaneous reserves. At the end of the lease, the customer can (1) purchase the equipment for its fair market value (which in most cases as little as 10% of the cost or even $10), (2) upgrade the equipment, (3) return the old equipment.

An inside picture of the Braymo wood-fired boiler facility shown on the front cover

Equipment and installation materials can all be leased-to-own. Payments would be approximately $20 per $1000 per month based on a 60 month lease with a 10% buy out. For example, if a lease was for $20,000, the payments would be approximately $400 per month.

The following is a partial listing of the boilers and furnaces the com-

pany has available:

BD Series: Moving Grate Hot Water / Steam Boiler, 3 - 32 Million Btu, *Burns:* Coal, Pellets, Grains, Wood Shavings, Wood Waste, Bark, Hog Fuel. Braymo has moving chain grate boilers are available for hot water or steam systems and burn coal, pellets, grains, wood shavings, bark, and hog fuel. Control is completely automated using a PLC control panel and color touch screen. In addition to the features with the top fed rotating bar boiler, these boilers have an automated soot blowing system and a multi cyclone system that the company says rivals natural gas emissions.

BK Series: Rotating Grate Hot Water Boiler, 1 - 32 Million Btu, *Burns:* Coal, Pellets, Grains, Wood Shavings, Wood Waste, Bark, Hog Fuel, Switchgrass Pellets. This top fed rotating grate hot water boiler is Braymo's most economical (per BTU output). It is completely automated, incorporating a soot blowing and ash removal system and an automated electronic lighting system.

BW Series : Atomizing Burner Hot Water / Steam Boiler, 1.5 - 28 Million Btu, *Burns:* Used-Oil, Crude Oil, Bunker Oil, Furnace Oil, Bio-oil (oil derived from biomass by pyrolysis).

BC Series: Cyclonic Suspension Burner Hot Water Boiler, 1 - 45 Million Btu, *Burns:* Saw Dust, Grains, Casings, Coal Dust, Straw, Switchgrass.These cyclonic suspension burner hot water boilers are completely automated, incorporating a soot blowing and an exhaust cyclone system. In these boilers, the fuel is blown in and burned before it hits the floor. Fuel particle sizes can be up to 0.25-inch in size.

FCN Series: Cyclonic Suspension Burner Indirect Fired Furnace, 1 - 28 Million Btu, *Burns:* Saw Dust, Grains, Casings, Coal Dust, Straw, Switchgrass. The FCN Series furnaces has the same features as the BC Series boilers.

FCD Series: Cyclonic Suspension Burner Direct Fired Furnace, 1 - 45 Million Btu, *Burns:* Saw Dust, Grains, Casings, Coal Dust, Straw, Switchgrass. The FCD Series furnaces has the same features as the BC Series boilers.

The company also has three lines of heat exchangers: brazed plate, plate and frame, and tube and shell. Other ancilliary equipment includes air handlers, baseboard heaters, chimneys, fresh air intake heaters, pumps, valves, and fittings; radiator coils, radiator fan units, self cleaning oil filters, underground pipe, and insulation.

Contact Braymo Corporation at Box 21890, Steinbach, Manitoba, Canada R5G 1B5. Phone toll free (within the US and Canada) +1 877 327 2966, fax toll free (within the US and Canada) +1 866 327 2966, email info@braymo.com, website www.braymo.com.

BERA'S Capitol Hill Luncheon Reviews US Forest Service Programs

Achieving Sustainable Forestry for Energy and Environment and the Important Role of the U.S. Department of Agriculture's Forest Service (USDAFS) Research was presented on December 2, 2004. USDAFS' efforts to preserve and expand our forests so that they can simultaneously supply a non-fossil, renewable, natural resource for conversion to energy, fuels, chemicals, and bioproducts on a sustainable basis was discussed. The USDAFS' present and future forest biomass energy research, the status of funding and joint cooperative projects with DOE, and the benefits of combining advanced woody biomass production for energy and forest management to minimize forest fires, particularly those that have been a plague on U.S. forests in the western states, were reviewed.

Forest biomass, supplies about 80 percent of U.S. biomass energy today, or about 1.7 million BOI/day, and is our largest reserve of terrestrial biomass carbon. Yet, wood and wood waste energy usage is far from its optimum sustainable potential as a renewable energy resource. For example, conversion of recovered wood wastes at a rate of only 1.0 dry ton/acre-year for energy applications from the estimated 190 million acres of federal forests and rangelands alone, which face high catastrophic risks of wild fires in part due to the continuous build-up of forest trash and dead trees, can potentially double this amount of biomass energy consumption. In fact, the annual U.S. loss of forest biomass because of wild fires is far greater than that utilized as an energy resource; more woody biomass literally goes up in smoke than that utilized for practical applications. Biomass energy usage will continue to be limited to niche markets for many years without large-scale, strategically located, integrated forest-biorefinery systems. Mr. Mark E. Rey, USDA's Under Secretary for Natural Resources and the Environment, summarized how the USDAFS' research is progressing to develop forest trash and small-diameter trees for integration into these systems.

Mark reviewed the statutory basis for USDAFS' energy R&D with cellulosic biomass: The Biomass Research and Development Act of 2002, the Healthy Forest Restoration Act of 2003 (The Act), and the annual Farm Bill; mandatory requirements for biomass energy R&D are contained in these bills. The five main objectives of this effort are: To provide new information on forest management, production, and harvesting systems; To advance small-diameter tree and wood waste removal methods; To increase R&D on short-rotation woody crop production; To develop new processes for converting wood wastes to energy; and To pro-

vide new tools for on-ground management and reinforcement of on-ground decisions. Much of this work is done in the Forest Products Laboratory in Madison, WI, and in partnership with DOE since enactment of the Biomass Research and Development Act of 2002, which also provides for program monitoring by the Biomass R&D Advisory Committee. The primary benefits of this program are that they reduce fossil fuel usage and emissions, increase biomass energy usage, reduce forest fires, and help to improve forest management, the removal and utilization of small-diameter trees, security, and rural economies. He mentioned a few success stories including the heating of rural schools with fuels made from lower grade woods, the assessment done with the Department of the Interior and DOE on biomass availability in the western forests, and the development of a wood-fueled 7,500-kW unit for continuous operation at a cost of $1,400/kW. Mark projected that in a few years, several projects on integrated biomass production and biorefinery projects will be completed jointly with DOE. Much of the forest biomass energy potential resides in remote locations, so new economic opportunities must be created. The USDAFS now has the authority to start such projects, such as the contract initiated last month with a consortium of three small companies in northern Arizona to manufacture wood pellets from small Ponderosa pines.

At this point in Mark's presentation, the meeting was opened for discussion. Excerpts of the comments and queries from the audience are listed here; abbreviated responses by the speaker and the attendees are shown in brackets. Although The Act provides for up to 20 million acres of federal land for hazardous fuel reduction projects, and Title II appears to provide funding of $54 million for biomass R&D, BERA's efforts to have moneys appropriated for USDAFS to develop combined forest thinning and trash removal with energy recovery have been only partially successful to date. Why has the USDAFS not funded work under Title II? (The difficulties of accessing remote locations and the excessive transportation costs form many forest areas affect the R&D that USDAFS performs, but about $12 million are available for biomass energy R&D under Title II and are expected to be used. There is no practical way to treat the forest land in some areas. About 80 million acres out of the federal total of 190 million actually need to be treated, not the entire amount. In FY 01 and FY 04, about one million acres and 4 million acres were treated. This required major changes in the way things are done. The plan is to have 80 million acres treated in 10 years. Appropriations for this program are under discussion for FY 06.) What are the possibilities for mobile pulping systems in which the pulp is transported from the forest to the mills, the cost of which has been reported to be competitive with the costs of transporting wood waste, and power is generated on-site from black liquor? (Transportation costs are too expensive to transport pulp to the paper mills. Fabricated wood products, e.g., oriented strandboard and wood pellets, can be made closer to the markets.) How can the timber industry be saddled with the cost of recovering wood waste? (This is not feasible unless money can be made. The industry currently recovers about 5% of the forest trash because there is a market, so USDAFS is looking for new markets to justify recovering the remaining trash. Instead of the usual average cost of $60 to $65/acre, a project in Arizona has been started to remove forest wastes at a one-time cost of about $30/acre until the wastes build up again.) Are there any opportunities for energy projects using forest wastes in the Southeast? Why does the USDAFS focus its R&D on public federal lands in the West? (USDAFS' work is largely focused in the West because of the frequency of catastrophic wildfires that occur in that region. There is also a larger amount of federal land ownership in the West than in the Southeast and Lake States. However, some moneys are available for work outside the western areas.) What can the woo-to-power companies do to avoid the risk of cancellation of power-purchase contracts with the end of PURPA? (One can discuss these matters with appropriate staff such as Frank Gladis on the Senate Energy and Commerce Committee, and Doug Crandal on the House Resources Committee. The might also be taken up with the staff working on the new energy bull expected to come before the 109th Congress. There is no particular resistance to the amount of funding available within policy limitations.) Is the Administration developing a new position on the Kyoto Accord in view of the Russian's recent commitment to it? (Others such as Bill Hohenstein can address this.) Has documentation been produced on the availability of woody biomass for energy? (Yes, it is available from the USDAFS.) How large is the USDA's biomass energy R&D and the grant and loan programs: (USDA's R&D programs on biomass energy are relatively large as are the many grants and loans provided by the Rural Business-Cooperative Service. See the consolidated tables available for purchase from BERA for fiscal years 2001 to 2003, and 2002 to 2004 for a comparison of DOE and USDA biomass R&D appropriations, and News From BERA's Capitol Hill Luncheon of February 12, 2003.)

It was concluded that there is considerable interest in a combined forest thinning-biomass energy recovery program to reduce wildfires and produce energy and fuels. USDAFS'

program is in the start-up stage.

The Biomass Research Association (BERA) was founded as a non-profit, membership organization in 1982 by North American industrial, institutional, and University researchers interested in the development and commercial utilization of renewable, environmentally clean, biomass energy systems. BERA's mission is to encourage biomass energy research in both the public and private sectors, and to facilitate information exchange, education, transfer of research results from the laboratory to commercial use, and international cooperation on all facets of biomass energy.

BERA's individual and corporate members are from a broad range of organizations. They include researchers and all levels of management from industry, research institutes, academia, the business community, energy companies, utilities, engineering and construction firms, and local, state, and national governments.

For information on BERA see their website at www.bera1.org.

Wright Environmental Management Inc. Biodryer™

Today, much of the organic waste streams from industrial processes (pulp & paper, sewage treatment, food & beverage, wood products), agriculture, municipal solid waste and farming (animal & poultry manure) ends up either as landfill or soil amendment.

However, landfills are closing down, tipping fees are rising and the use of organic waste as a fertilizer is becoming less of an option due to public opposition, health and environmental concerns.

In addition, wet sludge (mill, biosolids) is not stable when landfilled, since it releases greenhouse gases or leachate into the environment

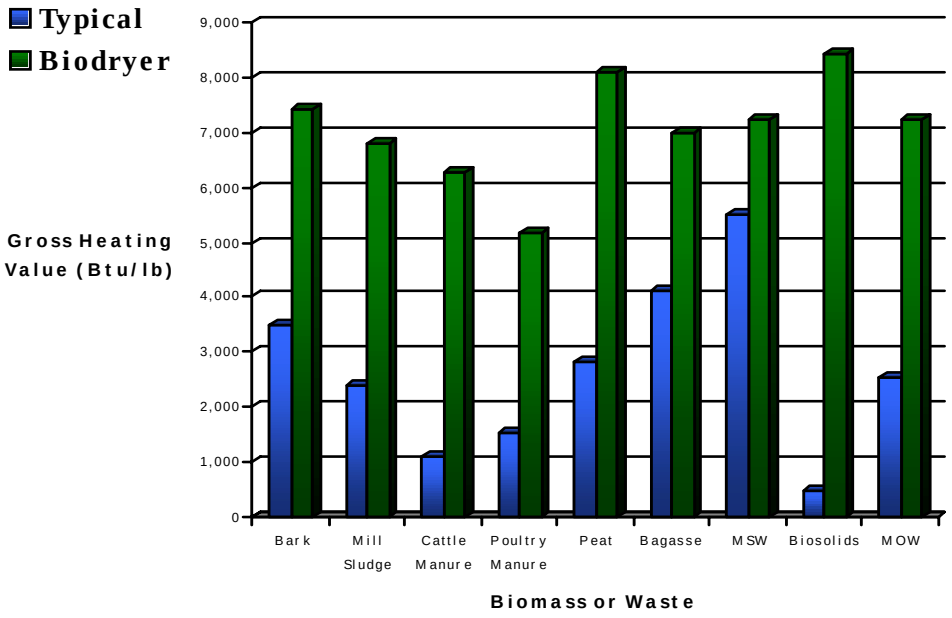
Organic waste contains various solid and liquid matter. Typically, these waste streams contain high levels of water (i.e. 40% - 90%); which makes them often too wet to use as fuel for biomass energy plants or cement kilns.

However, for optimum performance (calorific value, handling, density, safety, etc) most biofuels should have moisture content in the 5-20% range. Therefore, it is often necessary to utilize dewatering and drying technologies to help improve the quality of the biofuel.

For biomass resources that are very high in moisture content (i.e. sludges), it is often necessary to first dewater the biofuel before drying or considering it for a renewable energy project.

During the sludge dewatering process, water is removed from the sludge in order to concentrate the solids present. Mechanical assistance, such as centrifugation, vacuum or pressure, may increase the drainage rate and amount of water released from the sludge. In addition, chemical treatment can improve the dewatering performance of the mechanical equipment operation.

Unfortunately, the sludge dryness achieved by the best mechanical means such as screw presses is limited to around 40% solids (i.e. 60% moisture content). The limitation is



attributed to the physicochemical nature of the sludge and its associated "bound" water.

Therefore, even if a mill presently uses a screw press to dewater their sludge, the calorific value of this biofuel would be only 3,200 Btu/lb. Additional drying or mixing with drier biofuels would be necessary to utilize this sludge in a waste to energy or renewable energy project.

Furthermore, mechanical means of dewatering the sludge is very energy intensive and must be accounted for in the overall energy balance. The power consumption required for dewatering sludge using a screw press is about 40 kWh/ton while vacuum filters can be as high as 80 kWh/ton.

The objective of dryers is to make the biofuel easier to feed, easier to burn, and to allow production of more usable energy. Using dry biomass increases the overall efficiency of a boiler or gasifier process, since it is not necessary to waste energy vaporizing the moisture contained in the wet biofuel.

There are three requirements for drying biofuels:

1. A source of heat
2. A method of removing the water evaporated
3. Some form of agitation to expose new material for drying

How this is done in each type of dryer is what makes them different. Dryers can be broadly divided into two categories based on how the heat is provided for drying.

In direct dryers, the material gets heat from direct contact with a fluid providing the heat … either hot air or steam. With indirect drying, the material being dried is separated from the heat source by a heat exchange surface.

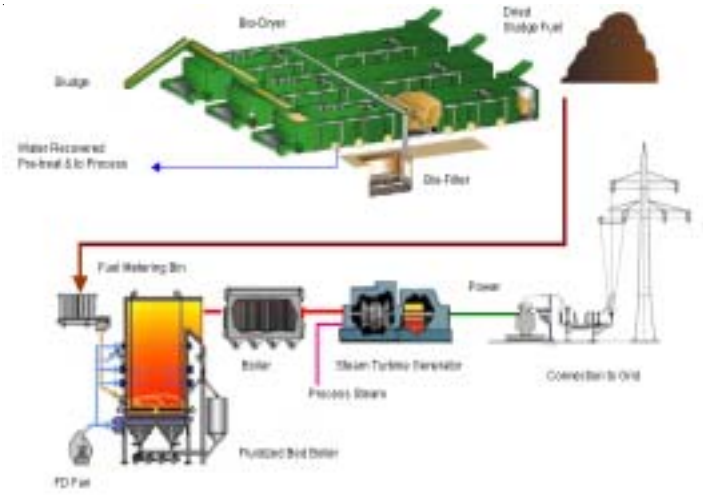
Although conventional drying technologies can reduce the moisture content to 10-20% or less, the energy input required to accomplish this task is very high. The major energy input being the heat required evaporating water and drying the biofuel. In most competing technologies, external fuel (natural gas, oil, etc) provides the necessary heat for drying.

Energy requirements from dewatering and drying equipment must be factored into the overall energy balance and the operating costs for the renewable energy or waste to energy project.

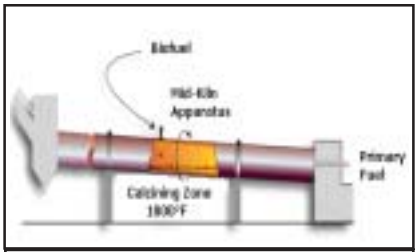
Various types of drying equipment have differing efficiencies for evaporating water. The accompanying table shows the heat and electrical requirements for several biofuel dewatering and drying systems with the level of dry solids they can achieve.

Unlike conventional thermal drying systems that require fossil fuels, are energy intensive and are expensive to maintain and operate, the Biodryer™ utilizes the heat produced during the aerobic decomposition process to cost effectively dry biosolids and other organic wastes for biomass and biofuel applications. Based on Wright's well-proven invessel composting technology, the Biodryer™ utilizes the "free" heat produced during the aerobic composting process to help dry the biofuel.

The accelerated aerobic process is brought about by naturally occurring microorganisms, which consume oxygen and produce the heat required for drying the biomass. With an accelerated aerobic drying process, the moisture, airflow, temperature, oxygen and C: N ratios are



Typical Direct Combustion Application (Steam or Cogen)



Typical Cement Kiln (calcining) Application

monitored and controlled within ideal ranges for maximum microbial and drying activity. The result is a dryer that efficiently dries organic waste or biomass without the need of natural gas, oil or steam (0 Btu/lb) and with very little electrical energy input (6-8/kWh/t).

The Biodryer™ is a double-walled insulated tunnel (stainless steel interior, burnished steel exterior) with an integral heat recovery system and computer processor to control the heat produced when this organic based biomass decomposes (Heat Zone). With this accelerated aerobic drying process, moisture, temperature, oxygen and the carbon/nitrogen levels are controlled within ideal ranges for maximum microbial and drying activity.

The Biodryer™ is divided into two distinct zones (Heat, Drying), which are separated by spinners. The Heat Zone is where the aerobic decomposition and resulting exothermic reaction takes place. In the Heat Zone, typical biomass temperatures will increase from 55°C after 24 hours to 80°C after 7 days. In addition, the moisture content of the biomass will decrease from about 55% to 40%.

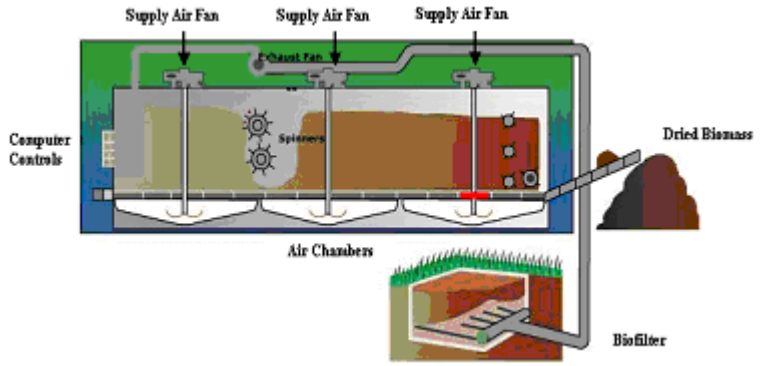
A heat recovery system captures the heat produced in the Heat Zone and transfers this heat into the air stream of the Drying Zone for improved drying performance. The biomass moisture content is reduced from 40% to about 10% (or setpoint condition) during the next 7 days in the Drying Zone to meet the client's specific biofuel requirements. Due to the low moisture levels in the Drying Zone, the aerobic decomposition process has practically stopped.

The biomass material is further aerated by mechanical means (spinners) before entering the Drying Zone to ensure that there are no anaerobic pockets in the biomass and more uniform drying is provided.

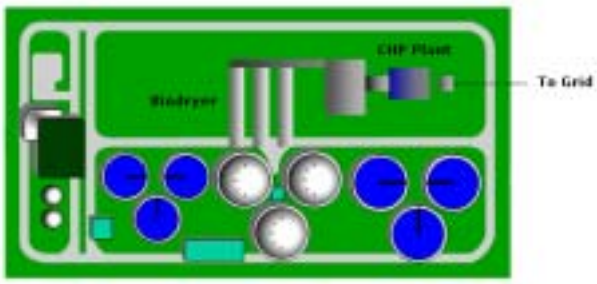
Therefore, unlike traditional composting systems, the Biodryer ™ is able to precisely control temperatures and moisture levels within the biomass while limiting the aerobic decomposition process to only 7 days. This unique design results in minimal carbon loss (CO2) and ash production, which translates into improved biofuel quality and calorific value.

The Biodryer™ can dry high moisture content organic waste streams like those found in pulp/fiber sludge, MSW or biosolids to 85% solids or better, without the combustion of fossil fuels and at a fraction of the energy and O&M costs associated with conventional thermal dryers (rotary, flash, steam).

In addition, since the Biodryer™ is not a combustion-based drying process, SCR's, scrubbers and similar pollution control systems are not required and air permitting is much



Biodryer™ Cross Section



Typical WWTP (biosolids) Application

Typical Energy Requirements for Various Dewatering and Drying Technologies			
Method	**Power kWh/ton**	**Thermal Btu/lb**	**Solids %**
Screw Press	40	0	30-40
Vacuum Filter	80	0	20-30
Flash Dryer	41	2200	80-95
Rotary Dryer – Single Pass	34	1900	80-95
Rotary Dryer – Triple Pass	34	1500	80-95
Steam	24	1250	80-95
Biodryer	20	0	80-95

simpler. The BiodryerTM can also be designed to produce an exceptional quality or Class A or B compost material should market conditions change or the economics be favorable for a compost product.

Finally, the Biodryer™ can recover much of the water removed from the wet organic waste and can also operate as an invessel composter if required. These unique features help to reduce energy and operating costs, improve project economics and provide the user with an output product (biomass fuel or compost) that best meets current and future market or political conditions.

In short, the Wright BiodryerTM now provides industry, municipalities, agricultural producers, cement kilns and power producers a viable solution to their waste problem and biomass drying needs.

For more information, contact Wright Environmental Management Inc., 9050 Yonge Street, Suite 300, Richmond Hill, Ontario, Canada L4C 9S6, phone +1 905 881-3950; fax 905 881-2334; or contact Russ Blades at russ.blades@wrightenvironmental.com; or visit their website at www.wrightenvironmental.com.

Funding Sources

ORNL EERE's State Partnerships Program FY05 Solicitation

ORNL EERE's State Partnerships Program (SPP) is issuing an FY 2005 solicitation for proposals, expecting to award four to five projects across six sectors (transportation, buildings, industry, renewables, electric transmission and distribution, and distributed energy). Proposals involving technologies for efficient use of energy or the use of renewable resources are solicited.

The SPP was established by ORNL's Energy Efficiency and Renewable Energy (EERE) Program in 1996 to forge partnerships with the State Energy Offices and the members of the Association of State Energy Research and Technology Transfer Institutions (ASERTTI) to accelerate the development and deployment of sustainable energy technologies. An overview of the SPP is on the web at http://www.ornl.gov/sci/eere/state_partnerships/index.htm.

The state and ORNL partners should submit a two- to three-page proposal (one copy only) describing the project, funding requested (projects are funded at $25-50K for ORNL research support and require that the state partners match the ORNL contribution through financial or in-kind contributions), participants, schedule and deliverables, and evidence of active participation in the project by your organization. Examples of active participation include contributions from industrial partners of materials, equipment, and in-kind effort; support for workshops and outreach to disseminate a project's findings; facilitation of meetings with state officials; and acquisition of monitored energy data.

SPP Technical Assistance (TA) is also available, requiring a one-page proposal and the same general information. TA projects are funded on average at $5K. This activity will be coordinated with DOE's State Technical Assistance Project. This Project is targeted to provide support to states on crosscutting policies and programs.

The deadline for this round of SPP proposals is March 11, 2005. Proposals by mail, e-mail, or fax are welcome (mail to Barbara Ashdown, Building 4500N, MS 6186; phone +1 865 576-3961; fax +1 865 576-7572; ashdownbg@ornl.gov). The SPP Review Committee will meet by early April to review this round of proposals. The results should be announced in April.

For questions about this solicitation or the Technical Assistance Project, contact Barbara Ashdown, SPP Coordinator, Energy Efficiency and Renewable Energy Partnerships Program, Oak Ridge National Laboratory, PO Box 2008, Oak Ridge, TN 37831-6186, E-mail: ashdownbg@ornl.gov, phone +1 865 576-3961; fax +1 865 576-7572, http://www.ornl.gov/EERE.

USDA Forest Service Announces Woody Biomass Utilization Grants; *Pre-Application Due March 15, 2005*

The USDA Forest Service is requesting proposals for projects to increase the use of woody biomass that is removed from National Forest lands in the effort to reduce hazardous fuels. Administered by the Technology Marketing Unit of the Forest Service's State and Private Forestry division at the Forest Products Laboratory here, the Woody Biomass Utilization Grant program seeks proposals that would improve the utilization of, and create markets for, small-diameter and low-valued trees removed during forest-thinning activities.

Improved utilization and expanded

markets for biomass material, it is believed, would help reduce forest-management costs by increasing the value of woody biomass, create incentives and decrease business risk for increased use of woody biomass, and help remove economic and market barriers to using small-diameter trees and woody biomass.

Of special interest are programs that accelerate the adoption of technologies employing biomass and small-diameter materials, or create community-based enterprises through marketing activities and demonstration projects, or establish small-scale business enterprises to make use of biomass and small-diameter materials. Such projects are expected to help revitalize rural communities whose forest-based economies have suffered in recent years.

A total of $4.4 million is available for grants this year. Individual awards will be between $50,000 and $250,000.

The two-stage application process calls for pre-applications to be submitted to Forest Products Laboratory by March 15, 2005. Following screening, selected applicants will be invited to submit full applications, due May 16. Awards will be announced June 1.

The fuel-reduction program and grants implement the administration's Healthy Forest Restoration Initiative. The grant program was further authorized as part of the Biomass Utilization section of the Healthy Forests Restoration Act of 2003 (Public Law 108-148) and funded in the FY 2005 appropriations.

The request for proposals was published in the Federal Register, February 10, 2005, pages 7078-7080.

Complete application requirements and procedures, definitions and evaluation criteria are available on the Forest Product Laboratory website at *http://www.fpl.fs.fed.us/tmu* (under Biomass Grants) or by phoning Sue LeVan-Green at FPL, at 608-231-9518/9504.

State Energy Program (SEP) Special Projects Opportunity. DOE is anticipating the availability of an estimated $14.7 million in new financial assistance awards from fiscal year 2005 appropriations. DOE's obligation for performance of this Funding Opportunity is contingent upon the availability of appropriated funds from which financial assistance awards can be made.

The awards will be made through a competitive process. The biomass-related programs that are participating in the State Energy Program Special Projects Opportunity for Fiscal Year 2005, with the estimated amount of funding available for each, are as follows:

- *Clean Cities:* This program will provide funds to support the deployment of alternative fuels and alternative fuel vehicles (AFVs) in the following six categories: (1) Projects that promote acquisition of commercially-available AFVs that maximize alternative fuel use, especially medium- and heavy-duty highway vehicles; (2) projects that promote AFV infrastructure development; (3) projects that promote idle reduction technologies; (4) projects that promote acquisition of heavy-duty hybrid electric vehicles; (5) projects that promote the acquisition of AFV school buses and refueling infrastructure; and (6) projects that support coalition activities ($4,000,000).
- *Industrial Technology Program:* The objective of this program is to work with national, State and regional industrial partners to plan and conduct outreach and technical assistance activities that target the most energy-intensive industrial plants in the State ($2,000,000).
- *Distributed Energy and Electric Reliability - Regional Combined Cooling Heating and Power Applications Centers:* The objectives of the Regional Application Centers will be to provide essential and appropriate applied research and development support, focused on the technology transfer and deployment of advanced Combined Heat and Power (CHP) technologies. The Regional Application Centers will achieve this objective through targeted education and outreach programs, as well as project assistance ($1,200,000).
- *Biomass:* This program will support the development of innovative State or local incentives and projects that will facilitate increased market development for bio-based power, fuels, and other valuable products ($500,000).
- *EERE/Air Quality Integration:* To quantify and verify the air emission reductions, energy benefits and economic benefits of existing SEP or SEP Special Projects funded energy efficiency and renewable energy projects. All projects should be replicable in another area of the country and build capacity within State agencies ($150,000).
- *Federal Energy Management Program:* Applications should promote and facilitate sustainable design and construction, energy efficient operations and maintenance, distributed and renewable energy, renewable energy purchases, siting of renewable power on Federal sites, and assessment and implementation of load and energy reduction techniques ($400,000).

Eligible applicants under this opportunity are limited to the 50 States and territories, although States may work in collaboration with non-State partners. Closing dates vary by category but start around May 2, 2005.

Applicants can obtain access to the funding opportunity through DOE/

(Continued on page 12)

Calendar of Events

March 1, 2005
Sacramento, California
2nd Annual California Biomass Collaborative Forum
http://biomass.ucdavis.edu

March 1-3, 2005
Las Vegas, Nevada
Power-Gen, Moving into the Mainstream
www.power-gengreen.com

March 2, 2005
Salem, Oregon
2004-05 Forum for Business & Environment
http://www.orcouncil.org/Events

March 2-3, 2005
Baton Rouge, Louisiana
Alternative Energy: The Future of Louisiana's Energy Industry?
Louisiana State University Center for Energy Studies, Baton Rouge, LA 70803

March 3, 2005
Richmond, Virginia
The 3rd Quarter Bio-Fuels Forum
www.smv.org

March 7-9, 2005
San Francisco, California
BioCycle West Coast Conference
www.biocycle.net

March 9-11, 2005
San Francisco, California
Hart World Fuels Conference: San Francisco 2005
www.worldfuelsconferences.com

March 9-11, 2005
Clemson, South Carolina
Power Systems Conference
www.ces.clemson.edu/powsys2005

March 14-16, 2005
Sao Paulo, Brazil
Sugar and Ethanol Brazil
www.agra-net.com

March 15-17, 2005
Syracuse, New York
Dairy Manure Management: Treatment, Handling, and Community Relations
www.nraes.org

March 22-23, 2005
Jackson, Mississippi
Southern Bio-Products Conference
wes_miller_1@hotmail.com
duanem@ios.msstate.edu

March 29-April 1, 2005
Washington, DC
NHA Hydrogen Conference 2005—Partnering for the Global Hydrogen Future
www.hydrogenconference.org

April 2-6, 2005
Monaco
21st Worldwide Battery, Hybrid and Fuel Cell Electric Vehicle Symposium and Exhibition
www.evs21.org

April 4-5, 2005
Arlington, Virginia
Environmental Issues for Energy Generation in the Non-Utility Sector
www.awma.org/events

April 7-8, 2005
Lexington, Kentucky
Kentucky Forest Industries Association Annual Meeting
www.kfia.org

April 20-22, 2005
Orlando, Florida
World Congress on Industrial Biotechnology and Bioprocessing 2005
www.bio.org/events

May 1-4, 2005
Palm Springs, California
AFVI 11th National Clean Cities Conference and Expo
www.afvi.org/palmsprings

May 1-4, 2005
Denver, Colorado
27th Symposium on Biotechnology for Fuels and Chemicals
www.nrel.gov/biotech_symposium

May 2-5, 2005
Las Vegas, Nevada
Waste Expo
www.wasteexpo.com

May 3-5, 2005
Washington, DC
6th Annual CHP Policy Summit
www.uschpa.org

May 18-19, 2005
Louisville, Kentucky
9th Annual Symposium Distillers Grains/Distillery Operations
www.distillersgrains.org

May 21-25, 2005
Beijing, China
2nd Asian Renewable Energy Fair and Conference (REAsia 2005)
www.re-asia.com

June 1-3, 2005
Chicago, Illinois
Greening the Heartland 2005: Cost, Practice and Policy
www.greeningtheheartland.org

June 12-14, 2005
Cody, Wyoming
15th Annual EPAC Ethanol Conference—Spurring Ethanol into the Future
www.wthanolmt.org

June 12-14, 2005
Point Clear, Alabama
Summit on the Rural South
www.southern.org

June 27-28, 2005
Yerevan, Armenia
Second Renewable Energy Conference
Christine Simonyan,
piuesc@arminco.com

June 28-July 1, 2005
Kansas City, Missouri
2005 Fuel Ethanol Workshop & Expo
www.fuelethanolworkshop.com

June 29-30, 2005
Morgantown, West Virginia
Wood Biomass Conference
sgrushec@wvu.edu

Calendar of Events *(cont'd)*

June 29-July 1, 2005
Chicago, Illinois
Innovative Uses of Animal Manure and Biosolids—Developing and Marketing Innovative Technologies
www.wef.org

July 1-4, 2005
Guangzhou, China
Agritech China 2005
www.faircanton.com

August 1-5, 2005
Perth, Western Australia
IEA Bioenergy Task 30, Task 31, Multiple Benefits from Sustainable Bioenergy Systems
www.ieabioenergy.com

August 6-12, 2005
Orlando, Florida
ISES 2005 Solar World Congress
www.swc2005.org

September 13-15, 2005
Richmond, Virginia
Virginia Sustainable Future Summit
www.envirsol.com

October 11-12, 2005
Saratoga Springs, New York
Empire Energy & Environmental Expo
www.eba-nys.org

October 17-21, 2005
Paris, France
14th European Biomass Conference and Exhibition
www.etaflorence.it

(Continued from page 10)

NETL's website at http://www.netl.doe.gov/business. For further information contact Kelly A. McDonald, MS I07, U.S. Department of Energy, National Energy Technology Laboratory, PO Box 880 / 3610 Collins Ferry Road, Morgantown, WV 26507-0880, E-mail Address: kelly.mcdonald@netl.doe.gov, telephone Number: +1 304 285 4113.

Sustainable Gas From 'Roasted' Wood Is A Feasible Option

'Roast' hardwood at relatively low temperatures and then gasify it. Dutch chemical engineer Mark Prins has shown that this is an efficient means of producing sustainable energy. The gas produced can be used for the production of electricity, fuels and/or chemicals.

Prins followed a thermodynamic approach to investigate how biomass could be gasified as efficiently as possible. He developed a concept which combines two techniques: torrefaction ('roasting' at a temperature of 250 to 300°C) and gasification. Roasting increases the calorific value of the biomass and decreases its humidity content. This considerably improves the properties of the biomass for gasification. At practical gasification temperatures between 900 and 1200°C, roasted biomass becomes less 'over-oxidised' than untreated biomass, which is favourable for the efficiency of the process. Efficient processes of this type need to be further developed if sustainable energy is to become a feasible option.

Experimental research into the torrefaction of biomass was carried out in cooperation with the Netherlands Energy Research Foundation (ECN) and Shell Global Solutions, with the support of the Sustainable Energy Foundation (SDE). The process is more suitable for hardwood (e.g. beech and willow) and straw, than for softwood (e.g. larch), due to the composition of the hemi-cellulose fraction in the wood. During his research, Prins developed a model to describe the weight loss of the wood and he also analysed the products formed.

Prins focussed on the technological development of the gasification process. However, he acknowledges that other non-technical aspects are important for further implementing this type of process: in particular the cost and availability of biomass and the social acceptance of this energy source. These aspects are also being investigated in the biomass programme at Eindhoven University of Technology. For example, it has been found that at present, the public thinks using waste materials as an energy source is more sustainable than using cultivated crops and wood.

The research formed part of the programme 'Biomass as a sustainable energy source: environmental load, cost-effectiveness and public acceptance' that is being financed by NWO/SenterNovem Stimulation Programme Energy research. This programme is a joint initiative of SenterNovem and the Social Sciences Research Council. Its aim is to develop knowledge in the natural sciences and humanities concerning the transition towards a sustainable supply of energy.

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